this. On p. 159 of Mr. Maitland's translation we have:—

"Well, one day I received a visit from M. Hadamard, and the conversation turned upon this antinomy [of Burali-Forti].

"'Does not Burali-Forti's reasoning,' I said, 'seem to you irreproachable?'

"'No,' he answered; 'and, on the contrary, I have no fault to find with Cantor's. Besides, Burali-Forti had no right to speak of the whole of *all* the ordinal numbers.'

"'Excuse me, he had that right, since he could always make the supposition that

$$\Omega = \mathrm{T}' (\mathrm{No.}\ \bar{\bar{\epsilon}} >).$$

I should like to know who could prevent him. And can we say that an object does not exist when we have called it Ω?'

"It was quite useless; I could not convince him (besides, it would have been unfortunate if I had, since he was right). Was it only because I did not speak Peanian with sufficient eloquence? Possibly, but, between ourselves, I do not think so."

Dr. Halsted's translation on p. 459 is as follows:—

"Now, one day M. Hadamard came to see me, and the talk fell upon this antinomy.

"'Burali-Forti's reasoning,' I said, 'does it not seem to you irreproachable?' 'No, and on the contrary, I find nothing to object to in that of Cantor. Besides, Burali-Forti had no right to speak of the aggregate of *all* the ordinal numbers.'

"'Pardon, he had the right, since he could always put

$$\Omega = \mathrm{T}' (\mathrm{No.}\ \bar{\bar{\epsilon}} >).$$

I should like to know who was to prevent him, and can it be said a thing does not exist, when we have called it Ω?'

"It was in vain, I could not convince him (which besides would have been sad, since he was right). Was it merely because I do not speak the Peanian with enough eloquence? Perhaps; but between ourselves I do not think so."

Of course, Poincaré spoke of "*le péanien,*" but this is scarcely a sufficient excuse for Dr. Halsted's translation.

On the other hand, it is rather evident that technical terms presented a difficulty to Mr. Maitland. He translates "*invariant*" by "invariable" on p. 35, "*la théorie des congruences*" by "theory of congruents" on p. 41, and "*implique*" by "involves" on p. 161. Dr. Halsted gives, as we should expect, the correct translations at the corresponding places of his book (pp. 375, 379, 460). It is rather unusual to speak of analytic functions as "analytical functions," as Mr. Maitland does on p. 77; Dr. Halsted uses "analytic" on p. 403. It seems to be confusing to speak of a paper, published by Mr. Russell in the Proceedings of the London Mathematical Society, as a "treatise," as Mr. Maitland does on p. 184. Dr. Halsted has "memoir" on p. 477, but has no reference on his p. 479 to the paper in question, whereas Mr. Maitland has (p. 187). Mr. Maitland carefully speaks of a Frenchman as "M." so-and-so, of an Englishman as "Mr.," and of an Italian as "Signor"; but for Germans he has no regular prefix: we often come across "Mr. Hilbert," and, quaintly enough, on p. 192, "Signor Zermelo." Of greater importance than this is that a formula of Burali-Forti, expressed in Peano's symbols, is wrongly reproduced on p. 157 of (1), owing to the fact that Burali-Forti's symbol "Un" is translated "one," thus giving some colour to Poincaré's mistaken contention that the idea of *one* is used in the very definition of "1." In (2) the formula is correctly reproduced (p. 488).

It does not seem necessary to characterise here Poincaré's philosophical writings: Mr. Russell, in his preface to (1), has done this admirably. All the four books under review will be useful in spreading a knowledge of the lighter works of a truly great man. As is so often the case, a lively and amusing style is here, too, sometimes accompanied by superficiality, and original thoughts by obstinacy. Poincaré's preface to (2) is very welcome at the present time: it lays stress on the fact that there is no reason for wishing the world exclusively impressed with the characteristics of one particular race.

As we might expect, (3), which is the seventeenth volume of the series "Wissenschaft und Hypothese," which contains translations of the first two of Poincaré's works quoted above, is admirably translated and provided with learned and excellent notes by Prof. F. Lindemann.

Finally, (4) is provided with a portrait of Poincaré, and the translation seems well done. The remark that the word "Anzahl" means the same thing as "Mächtigkeit" (p. 108) is wrong, and a title is wrongly spelt on p. 111. A somewhat serious mistake, which appears in the editor's note on p. 124, is the failure, like Schröder's, to distinguish between the notions "is contained in" and "is a member of." ϕ

NEW CHEMICAL BOOKS.

(1) *A First Book of Chemistry.* By W. A. Whitton. Pp. vi+150. (London: Macmillan and Co., Ltd.; New York: The Macmillan Co., 1914.) Price 1*s*. 6*d*.

(2) *An Introduction to the Study of Organic Chemistry.* By Dr. H. T. Clarke. Pp. viii+484. (London: Longmans, Green and Co., 1914.) Price 6*s*. 6*d*.

(3) *Methods of Quantitative Organic Analysis.* By P. C. R. Kingscott and R. S. G. Knight. Pp. xvi+283. (London: Longmans, Green and Co., 1914.) Price 6*s*. 6*d*. net.

(4) *Elementary Household Chemistry, an Introductory Text-book for Students of Home Economics.* By Prof. J. F. Snell. Pp. viii+307. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1914.) Price 5*s*. 6*d*. net.

(1) WE fancy that reviewers of a new book would generally appeal first to the preface to learn the object of its author in committing his ideas to print, then try to discover, especially in an elementary text-book, any originality in the method of treatment or arrangement, and finally read the descriptive part. Taking these points in reference to this little "first book of chemistry," it is interesting and satisfactory to learn that it follows no particular syllabus and so gives the author entire freedom in his method of treatment. Books on elementary chemistry are so numerous that there seems to be little room for novelty either in arrangement, description, or experimental illustration, and we have failed to discover anything intrinsically new; but such experiments as have been selected are simple and suggestive in character, and the illustrations which accompany them are unusually good. The treatment is essentially qualitative and non-theoretical. There is no attempt to impose on a student any immature notion of what chemical changes denote. He studies them in great variety and observes their results. He is troubled with no atomic theory, no symbols, and no equations. He learns a lot of hard experimental facts in the first fifteen chapters, and in the sixteenth and last he obtains a little glimpse into the quantitative relations of the reactions he has examined.

We can conceive of no better introduction to chemistry than this book provides.

(2) The volume has been written to cover the new syllabus of the Board of Education and possibly to meet the needs of candidates for medical examinations in organic chemistry.

In his preface the author points out that there are two distinct and incompatible systems of imparting a knowledge of organic chemistry by means of a text-book, one being based upon the theoretical, and the other on the practical, point of view. Why they are incompatible is not apparent; for every theoretical statement must be built upon an experimental foundation and, to be logical, a clear statement of the experimental part should either precede or at least accompany the theory. For the author, it should be added, assumes that the reader is entirely unfamiliar with the nature of organic substances. To illustrate the author's method, we may refer to the paragraph on page 2, that is, at the very commencement of the book, before any description of an organic substance is given. "Now it has been found that when methane is *treated* with chlorine in diffused daylight, a mixture is obtained of products which contain carbon, hydrogen, and chlorine, together with one which contains only carbon and chlorine. On separating these substances by *fractional distillation* and *analysing* [the italics are the reviewer's] them we find the composition of the various pure constituents may be expressed by the formulæ: CH_3Cl, CH_2Cl_2, $CHCl_3$, CCl_4."

Without inquiring too closely into how these four substances, one of which is a gas, can be separated by fractional distillation, or how the formulæ can be ascertained by an ordinary analysis, we would point out that the student is left quite in the dark as to the nature of any one of the three operations referred to.

Of the two incompatible systems, it seems preferable to the writer to attempt to memorise the description of a series of experiments, which he can understand and visualise, even if he has not the opportunty of performing them, than to learn by heart the mere names of operations which have not been explained and, in the present case, are incapable of giving the results suggested.

Supposing, however, that a practical course of instruction accompanied or preceded the perusal of this book, so that the student was able to realise the significance of the expressions "treat with" or "react with," which frequently recur, and the practical meaning of the series of equations which fill (without any description of the substances involved) the first eighty pages, the book, though overloaded with formulæ, should be of considerable help in acquiring a knowledge of the structure of a large number of groups of compounds and of equations representing fundamental reactions.

(3) This volume, which has been compiled with evident care by its authors, is of a sound, practical, and useful character, and should commend itself to chemists in general and to organic chemists in particular.

The information here collected is not always easy to obtain, unless the reader has had recourse to the German of Hans Meyer. So far as the writer can judge the methods described are well established and of considerable value.

If one criticism may be offered, it is that the authors give few results of their own individual experience. Such intimate knowledge of detail, as the frequent repetition of an analytical method affords, is invaluable to those who have occasion to employ a new analytical process without previous experience, and adds enormously to the value of the description. For example, a knowledge of this kind would decide which of the three modifications of Zeisel's method here given is the most convenient and trustworthy, and so save the necessity of an elaborate account of all three.

Apart from this and as a compilation and accurate transcript of important methods and of references to original memoirs, the book is eminently useful, and is sure to find a secure place on the library shelves of most organic chemists.

(4) The author's object is to introduce the applications of chemistry to household affairs as early and as often as possible. This has been systematically carried through, yet one feels that the introduction of these household topics are in the nature of a concession to the title rather than an integral part of a scheme for teaching chemistry. The book begins, after the usual fashion, and with the usual doubtful success, by attempting to distinguish between a physical and chemical change. It then passes on to the elements, chemical notation, and the atomic theory, after which, by a curious reversal of the ordinary sequence, the law of definite proportion is discussed. Combustion is followed by an account of fuels, gas burners, and illuminants, and so forth, and about half-way through we come upon organic compounds, soaps, food stuffs, etc., whilst textile fibres, dyeing, and bleaching complete the final chapters.

The book, no doubt, represents an honest attempt to build on a theoretical foundation a superstructure of technical facts and problems more or less connected with our daily life; but this attempt within the limits of a small volume renders the superstructure top-heavy, and the result is that much of the information is superficial, the explanations frequently inadequate and confusing, by reason of their brevity, and the style essentially didactic. We would refer especially to the chapters on the atomic hypothesis, on ionisation, and on the organic radicals, which are mere statements of theory.

These defects are to some extent compensated by many well-chosen experiments and by the excellence of the "get up" of the book, which is embellished by numerous portraits. It should be added that the statements in small print under the portrait of John Mayow are incorrect.

J. B. C.

OUR BOOKSHELF.

Transactions of the Paisley Naturalists' Society. Vol. ii. Lists of Renfrewshire Plants, Macro-Lepidoptera, Fresh-water Fishes, Amphibians, Reptiles, Birds, Mammals, and other papers, with introductory notes by the editor, the Rev. C. A. Hall. Pp. xvi + 120. (Paisley: A. Gardner, 1915.) Price 3*s.* 6*d.* net.

A WELCOME sign of the continued vigour of natural history interests throughout the country is the increasing number of regional surveys The last we saw—a few months ago—was from Bournemouth, and now we have one from Paisley. Some of these scientific guides have had their origin in visits of the British Association, others have been due to the enthusiasm of a single individual, and others, like the one before us, express the activity of a local society. The editor leads off with a useful introduction on Renfrewshire as a whole. It might well have been longer, but he tells the reader where to go for further information. In the list of plants by Mr. Daniel Ferguson, the stations have been deliberately omitted as it is one of the main objects of the society to guard the treasures of the county against extermination. Mr. Alexander M. Stewart deals with the Macro-Lepidoptera, Mr. Thomas Malloch with the birds, Mr. Malloch and the editor with mammals, and Mr. Duncan Smith with the fossils in the Paisley Museum. There are also lists of reptiles, amphibians, and fresh-water fishes. While we cannot regard the volume as more than the beginning of the kind of regional survey every county should aim at, we appreciate the industry and carefulness represented in the lists. For future editions we suggest that introduced forms such as the edible frog, the natterjack toad, and the grass snake should not be included in the ordinary list, however clearly it may be noted that they should not be there. With a multitude of names it is difficult to avoid misprints, and it is with sympathy that we call attention to Pel*ius* and Tropidon*a*tus on one page. The classification of reptiles is new to us and strange. But these are trifles; the volume is a step in the right direction and a credit to those concerned. We wish for the Paisley Naturalists' Society, which this year attains its majority, a long and prosperous life.

Biology. By Prof. G. N. Calkins. Pp. viii + 241. (New York: H. Holt and Co., n.d.) Price 1.75 dollars.

THIS introduction to general biology has a pleasing freshness, a quality difficult to attain in these days of many books. It has necessarily much in common with other good introductions, such as Parker's "Elementary Biology," but it is distinctive. It considers general biology as having to do with fundamental facts and principles—with protoplasm and vitality, metabolism, food and transformations of energy, organic architecture, inter-relations, the curve of life from development to senescence, and, finally, species and the factors